PROCEEDINGS

APCHI-ERGOFUTURE 2010

DEWA PUTU SUTJANA
I PUTU GEDE ADIATMIKA
I GUSTI NGURAH ARDANA
I. B. K. GEDE DHARMA PUTRA

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PREFACE

Dear Colleagues

Welcome to Bali. On behalf of the organizing committee, we would like to welcome all of participants of APCHI-ERGOFUTURE 2010. We do hope all of you could get more experiences from your participants in this conference in particular, and new ideas during you stay in the famous of Bali as tourist destination.

As usually, every conference should be recorded in a book or proceedings for future information and recognition. Sometimes the participants will need this proceeding for their job promotion. There many papers are printed in this proceeding according to the journal template. But, there some papers that were accepted past on deadline and were not written as same as the template.

This proceeding was design and printed based on the theme and the schedule of presentation. So, if you want to find your paper, you can use tha theme folder. Hopefully, this book can give you more achievent in your job and bring more memory about Bali to your country.

On this good opportunity, special thanks are addressed to our sponsor, government and partners that support this conference.

Thank you.

Organizing Committe

CONTENT

WELCOME FROM CONFERENCE CHAIR

Om Swastyastu,

Based on long experiences working in Human Computer Interface (HCI), Ergonomics (Erg), occupational safety and health (OSH), up to now we are practically still running at the same place. Accident or occupational diseases in fact still happening, even in the workplace equipped with up to date regulation and personal protected devices. Unsafe acts and unsafe behavior must be managed to develop safety behavior. Mind set changes become an important issue to be success. To solve that problem, Balinese Brach of Indonesian Ergonomics society supported by APCHI, PEI, IEA, Center of Ergonomics Study of Udayana University and Bali Human Ecology Study Group (BaliHESG) organize the Joint International Conference Asia Pasific Computer Human Interaction and Ergofuture 2010, namely APCHI-ERGOFUTURE 2010. The conference will be held at Sanur Paradise Plaza Hotel and Suites, Bali on 2 - 6 August 2010.

The goals are: 1. to provide guidance and direction for young ergonomist, 2. to show the unfit, improper, inappropriate research and application of ergonomics and OSH, 3. to convince that a total and a more strategic approach must be done in conducting research and application with aim to have maximum benefit.

The scientific program of APCHI-ERGOFUTURE 2010 including: 1. pre conference symposium, workshops and tutorials, 2. keynotes address, 3. free communication (parallel session) such as: human computer interface, cultural, hospital, aging, small scale industries, industrial sports, disable, children, women, cognitive, product design, displays and warning, mining, MSDs, ODAM, office, communities, transport, tourism, agriculture, architecture, school, home, industrial, etc; 4. student papers for undergraduate; 5. accompany program and 6. additional tour (under request and number of participants). To make the conference more successfully, the organizing committee invited overseas participants to participate in the conference. Bali is a paradise island with unique attraction culture shall becoming unforgettable experience to all participants.

Om Shantih, Shantih, Shantih Om,

Conference Chair
Prof. dr. I Dewa Putu Sutjana, PFK, M.Erg

WELCOME SPEECH FROM
PRESIDENT OF INDONESIAN ERGONOMICS SOCIETY

Dear Colleagues,

The world has change, tight competition and complex problem will occur.
The problem is related to global changes, and it will not be possible to solve the problem individually.
It needs a comprehensive approach. All experts, scientists, and stakeholders should joint and sit together to get the proper and appropriate way in implement the new information, new techniques or researches in the communities by using a simple technique and easy to use by the people. This is our task to bridge the scientists and communities in problem solving by thinking globally and act locally, using comprehensive approach.
On behalf of Indonesian Ergonomics Society or Perhimpunan Ergonomi Indonesia (PEI), I would like to welcome all colleagues interest to this conference. As a new President of PEI, I would like to say thank you very much to the APCHI that has pointed PEI as the host of APCHI 2010 and decided Bali as the location of the conference. It will be jointly organized with Ergofuture 2010.
It's a good experience if you could come to this conference, because the topics that are proposed by the organizing committee are very interesting. There many topics about human computer setting interaction and ergonomics as a whole that are organized is parallel session, key notes address, symposium and other seminars. So, please prepare your paper and send it to the organizing committee as soon as possible related to time schedule from the OC.
On this occasion, I appreciate very much to the OC who work very hard to prepare this conference. I hope all of you plan can be done properly. I hope the God bless you and the conference will be done successfully.

President of Indonesian Ergonomics Society
Dr. dr. I Putu Gede Adiatmika, M.Kes

SPEECH FROM PROMOTOR OF ERGOFUTURE

Dear Good Friends,

We shall organize ergo future International Seminar (Ergo future 2010) again in Bali, August, 2-6, 2010. This shall be jointly conducted with the Asia Pacific Computer Human Interaction (APCHI-2010)

Why we have to organize Ergofuture2010?

1. As problems never ended, it is logically that we have to carry out again our ergo future, not only to accomplish the residue, but also to solve the new problems we are and shall be facing in the future pro-actively.
2. Having healthy-fit human resources to be productive enough by accommodating with ergonomics working conditions and environment is really an ultimate task for ergonomists. In doing so a total approach must be done.
3. This is not an easy job and must be done through serious hard effort and must be strongly supported by new mind set.
4. Ergonomics problems and solution in agriculture, tourism, small and medium scale enterprises, sustainable development, transportation, school and education, mining, fishery, forestry, plantation, industry, military, health care, home, human computer interface, aviation, sea fares, etc are our main targets to be deliberated in this coming conference. And it shall cover children, gender, women, ageing, and disabled workers.
5. In the meantime, we should consider various facts which could highly influence this works.
   - Disasters, in term of earthquake, tsunami, flood;
   - Global warming with its impacts;
   - The emerging 24 hours society with all its consequence;
   - The still existing of old traditional economic problems,
   - Increased technology transfer problems and issues (HCI), and finally
   - The existing of old “instant noodle” mind set among policy, decision makers, and designers becoming a pile of problems which must also be seriously considered.

What Ergo future 2006 as the first ergo future attained? What are the challenges

The demand to apply a total and a more strategic approach to carry out research and application of Ergonomics and Occupational Safety-Health with aim to have maximal benefit, practically in fact have been anticipated by many researches and application based on Total Ergonomics Approach. The PhD and Master Degree Program of Ergonomics, Tourism and Environment students at Udayana University have started to use the Total Ergonomics Approach in their Dissertation and Thesis. The words of Holistic and Participation approached have been spoken / used at large, from policy makers up to the people at the grass root. New mind set, to think and act holistically, have been owned and practiced by those who concern and commit to sustainable development of Bali. The goal of better life which covers matters of health, safety, comfort and efficient elements has been increasingly being concerned and demanded by respected stakeholders from various institutions and disciplines. Interdisciplinary approach has been highly demanded and more and more disciplines needs to be involved in solving the more complex problems. Individual capacity building to work in a team becoming a must. Various efforts being done to anticipate this situation. Practice and its theory gave more color to our curriculum. Bali Island as a whole becoming our real laboratory. Integrated ergonomics SHIP approach workshops have been intensively done as a conditioning forum for participants starting to think and act holistically. And workshop which was done at our ergofututе2006 indicated a lot of home works which need serious attention and sustained solution. More hard work efforts to campaign the benefit utilization of ergonomics to the respected significant target groups are still highly needed. Bridging the gap between research and application are still becoming crucial problems which should be overcome shortly. Human relation knowledge, attitude and practice are really a strong tool to be successful. Democracy and Human Rights principle and approach becoming a must. Human Capital investment not only to be talked but has to be implemented more seriously. And your active participation in filling the gap, bridge the gap and solve the problems are highly expected. Finally looking forward to seeing you all in Bali, the last paradise in this changing world.

Prof. I. B. Adnyana Manuaba, Horn.,FErgS

SPEECH FROM APCHI COORDINATOR

As a steering committee member for APCHI conferences, we kindly invite you who specialize in the HCI and the Ergonomics to APCHI-ERGOFUTURE 2010. As an APCHI conference, this is the 9th conference following the 8th conference held in Incheon, Korea in 2008 and will be followed by the 10th conference in Tokyo, Japan in 2012.
APCHI is a regional HCI conference in Asia Pacific region but also attracts many researchers and practioners from the US and European countries. It is my pleasure that APCHI conference is now held in Bali, a beautiful and attractive place for the conference and holidays. Why don't you join us at APCHI-ERGOFUTURE 2010 and enjoy the conference and scenic beauties, and warm hearted welcomes of Indonesian people.

Masaaki Kurosu

Design of Equipment Rack with TRIZ Method to Reduce Searching Time in Change over Activity
(case study : PT. Janssen Indonesia)

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Janssen is a manufacturing plant that works in furniture assembly. Component shortages often occurs, it will cause the increase of work in process (WIP) in assembly section. In previous studies, we analyze the root causes with FMEA and then it is resulted that router section is the constraint of the system. There are many non value added activities such as searching and transportation caused by a messy condition of work places and the devices that aren't put in the right place. The impact is that the time allocated for every change over is higher than before. There are many components that are worked by the router section, so improvements are needed to minimize changes in over time. 5S method and the use of a new design of rack by TRIZ method are suggested for fixing the conditions of work environment. It is expected to eliminate non value added activities and changes in over time.Result shows that we can reduce non value activities in change over of regular components up to 41% and the elimination of this time is 41,6%. The non value activities in changeover of new items is 36,6% and this elimination of time is 53,3%.
Key word : change over, kaizen, design, TRIZ method

Introduction

PT. Janssen often experiences lacking of components of the router section. It results in the increase of, waiting and work in process in the assembly section. Based on FMEA, this caused by the long changeover time. Cutting, jigs fixtures and other tools are irregular and require searching and unnecessary transportation. This research improves the system with the 5S (Sort, Straighten, Shine, standardize and sustain). In the Straighten stage, this research designs a cutting tools rack to arrange cutting tools. The purpose of this study is to reduce searching time and transportation activity. So that changeover time can be reduced and lead time in the router section can be reduce as well. This article will describe the design of the cutter and tools rack with Triz method..

TRIZ Methodology

TRIZ is powerful methodology for producing systematic innovation and improving the designer's thinking process. A basic principle of TRIZ is that succesful system evolve toward ideality, which is defined as the presence of the greatest amount of benefit and the least amount of cost and harmful effect. This is expressed by the concept of ideal final result (IFR) [Leon,2003].

- **Identification of Needs with diagram matrix between needs and variable** [Ulrich&Eppinger,2001]. From Diagram, the needs are precision of tools, easy to find and move, can to write, easy to reach when operation activity, saving area and anti-rust.
- **Identification of Tradeoff**
  Alternative design must be easy to find the tools so it can reduce searching time. Tradeoff is more area for tools.

- **Choose Point of TRIZ Principles**

Steps in Triz methode consists of :
a. improving feature, point 25. Loss of time
b. worsening feature, point 6. Area of stationery Object
c. Finding recomendation for problem solving
d. Finding Point in TRIZ method :
- point 10. Preliminary Action,
- point 35. Parameter changing (Transformation of properties),
- point 17. Dimensional Change (another dimension),
- Point 4. Symmetry Change (Assymmetry)

Result

Based on the improve point from Triz methodology, final design of cutting tools rack is in figure 1.

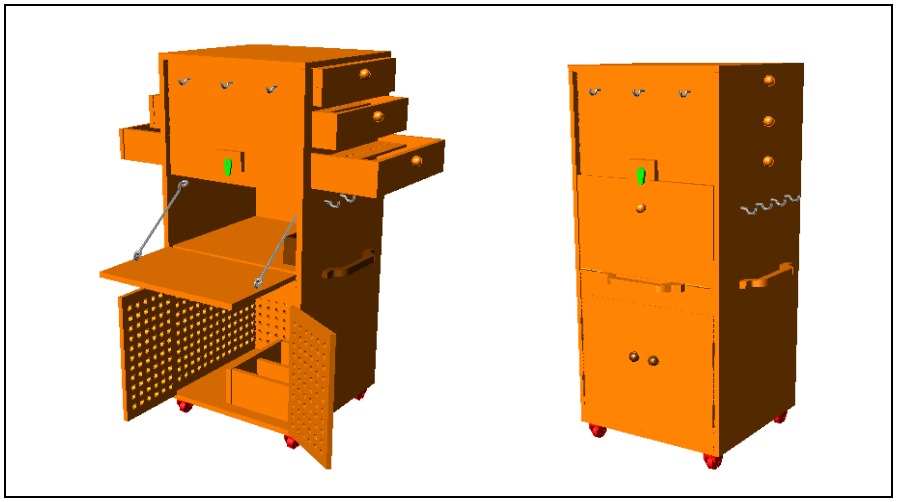
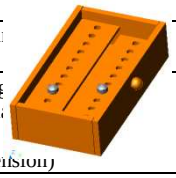
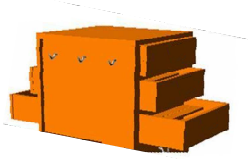


Figure 1. Final Cutting Tools Rack

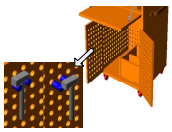
Comparison Between Initial Design and Alternative Design

The Validation of the design of the rack can be done by comparing the performance between initial design versus alternative design. If the alternative design can reduce searching time and transportation activity so the design can marked success..

1. Comparison Initial Design with Alternative Design

Initial			Solution			
tial Condition	Describe	Risk Factor	Improve	Describe	Efect	
	• Cutting tools in pocket 	• Bumps, so precicion of tools is not care.	Point 10, **Preliminary Action**, make hole for tools place Point 4**, Symmetry Change**	• Dont need pocket 	• The precicion tools with more care • Saving area • Not need open and close the pocket	• The mo • Eli put 'ou
	•	Need more time to find		• Cutti find	• Easy to find the tools	• Rec tim
	• placing tools	Need more time to find		• Desig on cl tools dimension)	• Easy to find the tools because the rack has classification of the drawer	• Rec tim
	• Only one side 	• Qeueing occured when the tool have to get together	Point 17, **Dimensional Change (another dimension)** • change rack with two side to reduce qeueing 	• Two side	• Reduce qeueing	• Rec
	• Too in th	• Difficult to find the tool. So too long to search tool in the drawer		• One type in the one drawer	• Easy to find the tools	• Eas too and one

1. Perbandingan rak lama dengan rancangan baru (lanjutan)

Initial			Solution			Salv
Condition	**Describe**	**Risk Factor**	**Improve**	**Describe**	**Efect**	
	• The tools is stacked in one place	• Tools is very difficult to find	Point 35, **Parameter changing (Transformation of properties)** 	• Classification of cutting tools and placing one tool in one hole • Make drawer in the rack for clamp placing • The tool is easy to find when rack opened	• Not more time to find the tools	• E • E s t
	• Rack is not in the central but in the many place • Rack can't be moved	• Too many transportation activity	` 	• Rack with wheels • Rack can move in the central section	• Rack in the central section so easy to get the tools	• E t n
	• Operator must go to the table to write and take "passed" • After write, operator go to tools rack	• Transportation activity too much because tools in the many places and can't write in the rack		• Operator also can write in the rack	• Transportation have been removed because all the tools are in the one place	• R t n

With Operation Process Chart, we can see that alternative rack can reduce change over time about 41,6% (regular component) and 53.3% (new item) . Because, the alternative design can reduce non value added activity up to 41% (regular component) and 36,6% (new item). Based on the data taken in June 2009, the total reduction time was up to 53.8 hour, Table 1.

Table 1. Comparison Initial change over vs Alternative

Category	Production Total (unit)	Actual		Alternative	
		per unit (second)	Total (second)	Per unit (second)	Total (second)
Regular component	542	822	445524	480	260160
New Item	11	1399	15389	650	7150
Total			460913		267310
		Reduction =			193603 second 53.8 hour

Source : Data Processing based on Data taken in June 2009

Conclusion

The Alternative design of equipment rack can reduce changeover time about 53.8 hour (2 days) in one month. If router section can produce 500 unit component in one day, so the alternative rack can reduce the lack of component to total of 1000 unit in one month.

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